

Technology Innovation Project



Project Brief

TIP 25a: EPRI Substation Seismic Studies

Context

The Institute of Electrical and Electronics Engineers (IEEE) Standard 693, Recommended Practice for Seismic Design of Substations, is used by electric power utilities to qualify substation equipment for seismic movements. Deficiencies exist in the present standard, and information is unavailable for dynamic response that may be used to better analyze equipment and permit their evaluation in case of limited configuration changes, such as insulator substitution. Representatives from utilities that had participated in the IEEE 693 Working Group, as well as several other utilities, were contacted to participate in a collaborative project to address these deficiencies.

Description

EPRI intends to conduct testing under the governing standard, IEEE 693-2005, with modifications that are deemed appropriate. In general, the input motions, instrumentation, test sequences, functional tests, and other requirements specified by the referenced standard will be used. Recently recommended standard improvements will be used to the extent possible.

Each item of equipment is expected to undergo tests required by IEEE 693-2005, with modifications as determined by the EPRI Technical Manager, with input from the participants.

A representative from each participating utility forms the governing body (under the direction of EPRI) for the project. Testing would be performed at appropriate test facilities as directed by EPRI, with input from the participants. The project is managed by an EPRI manager. Technical services are provided by the EPRI Technical Manager. The project addresses the deficiencies that exist in the present standard, especially those related to details left unspecified, by performing tests in the laboratory.

EPRI will select the item(s) of equipment that is (are) to be tested for each year. EPRI will establish equipment support structure specifications and vibration test requirements, electrical equipment specifications, and test specifications. EPRI also will select a vibration testing

facility (and electrical testing laboratory, if required) to perform tests and draw a contract for laboratory services.

The EPRI Technical Manager will prepare a Request for Proposal and issue it to equipment manufacturers. Equipment manufacturer(s) will then be selected to participate in the project. The Technical Manager will prepare a test plan in conjunction with the testing laboratory and the equipment manufacturer. The testing laboratory will perform qualification tests of one or more items of equipment under the overview of the Technical Manager. The manufacturer and testing laboratory will prepare qualification documentation for the equipment that is qualified following IEEE 693 requirements. The Technical Manager will prepare a project report describing the project.

Why It Matters

The project addresses deficiencies in the existing standard that evaluates performance of substation equipment, to ensure that qualified products will have higher probability of surviving earthquakes. As a result, both repairs of damaged equipment and power interruptions will be reduced, thus enhancing continuity of power supply to the public and lowering operating costs of electric power utilities. As stated in IEEE 693, equipment qualified using the recommended practice should "perform acceptably under reasonably anticipated strong ground motion."

Goals and Objectives

An important part of the project is to determine what deficiencies exist in the present standard, especially those related to details left unspecified. Tests are to be performed by a laboratory to gather dynamic response information that may be used to better analyze the equipment and permit its evaluation in case of limited configuration changes, such as insulator substitution. The knowledge gained from this project is intended to seismically qualify substation equipment using IEEE Standard 693, IEEE Recommended Practice for Seismic Design of Substations.

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Project Start Date: January 1, 2012

Project End Date: December 31, 2016

Reports & References (Optional)

Links (Optional)

Funding

Total Project Cost: \$120,000

BPA Share: \$15,000

External Share: \$105,000

BPA FY2013 Budget: \$15,000

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Participating Organizations

EPRI
PG&E
SDG&E
WAPA
Transpower

